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10/516,921	12/07/2004	Franz-Josef Dietzen	53647	7429
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EXAMINER DANIELS, MATTHEW J				
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/516,921

Applicant(s)

DIETZEN ET AL.

Examiner

MATTHEW J. DANIELS

Art Unit

1791

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 May 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6, 10-17 and 20-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6, 10-17 and 20-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 5/20/09
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(c), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(c) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 20 May 2009 has been entered.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 20-23 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over BIGLIONE et al. (US 4,606,873). Regarding claims 20-23, BIGLIONE et al. teach spheroidal granules with a diameter of about 1.2 mm (claim 22) [col.5, lines 39-40] with a density of 18 g/l are produced (claim 23) [col.5, lines 57-59]. Additionally, it is submitted that by providing a process similar to the claimed process, the particles having the claimed features would have naturally resulted. Additionally, it would have been obvious to one of ordinary skill in the art to adjust and modify the extrusion conditions, pentane amount, and other result-effective parameters to arrive at a pellet having the claimed characteristics.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over BIGLIONE et al. (US 4,606,873) as applied to Claim 20 above, in view of PLATZER (US 3,072,581). As to Claim 24, BIGLIONE does not expressly teach the pigment content. However, at least about 0.5 percent inorganic pigment is conventional for polystyrene foams. For example, see PLATZER, col. 1, lines 45-50. It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of PLATZER into that of BIGLIONE in order to provide a color to the material of BIGLIONE.
4. Claims 1-5, 15-17 and 20-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over BIGLIONE et al. (US 4,606,873) in view of ZIMMERMANN et al. (US 5,112,875) and MACK et al. (Trends in Underwater Pelletizer Technology: Considering New Types of Polyolefin Resins).

Regarding claim 1, BIGLIONE et al. teaches of a process for production of expandable granules of thermoplastic polymers like polystyrene wherein an expanding agent is incorporated with polystyrene polymer in an extrusion die-head with a temperature of about 160 degree Celsius [Abstract; claim 1; claim 7; example 1: 33-35]. BIGLIONE additionally suggests that

extrusion temperature is a result effective variable which must exceed the softening temperature [col. 3, lines 28-47]. BIGLIONE teaches that the die head comprises several holes having diameters that may be 0.7 mm [5:35-36] or vary between 0.5 and 4 mm [col.3, lines 55-56], and that the extrusion temperature depends on the sizes of the die-head holes [col. 3, lines 36-47]. The polymer melt extruded from the die head was granulated into granules having a diameter about 1.2 mm (and subsequently granulating the extrudate) [Example I, col.5, lines 36-40]. The values of die holes diameter and temperature at which process was carried as taught by BIGLIONE are inclusive of the ranges as required in claim 1.

BIGLIONE et al. is silent to the molecular weight of the expandable polystyrene polymer and the die plate temperature as required by claim 1.

ZIMMERMANN et al. teach polystyrene polymer used in a process for production of expandable styrene polymers wherein the average molecular weight of polystyrene ranges of about 180,000 to about 300,000 g/mol [Abstract; col. 3, lines 8-21].

MACK et al. teach that in an underwater pelletizer, it is known to heat the die plate to a temperature which is 30 C above the temperature of the melt (which would obviously be at the wall temperature). See page 219, Fig. 4, right.

At the time of invention, it would have been obvious to one of ordinary skill in the art to use the polystyrene polymer with molecular weight of about 200,000 to about 300,000 g/mol as taught by ZIMMERMANN et al. in the process of preparing expandable polystyrene polymers as taught by BIGLIONE et al. in order to produce polystyrene granules from expandable styrene polymers with high degree of expandability due to the use of low level blowing or foaming agents used to make articles like seat cushions. It would have been prima facie obvious to one of

ordinary skill in the art at the time of the invention to incorporate the pelletizer of MACK et al. into the process of BIGLIONE et al. in view of BIGLIONE et al's suggestion to use an underwater pelletizer, and MACK et al's teaching of a pelletizer within the scope of those suggested by BIGLIONE et al.

Regarding claim 2, the teachings as referenced in claim 1 apply.

Regarding claim 3, modified BIGLIONE in view of ZIMMERMANN teaches of a polydispersity of from about 1.0 to less than 2.5 [ZIMMERMANN, Abstract, col.3: 15-20]. The range is inclusive of the range of at most 3.5 as required.

Regarding claim 4, modified BIGLIONE teaches that the polymer used in the process is polystyrene which reads on the requirements of the claim. It would have been obvious to one of the ordinary skill to use different kinds of styrene containing polymers and copolymers in the process as taught by modified BIGLIONE in order to ensure the production of styrene granules with high expandability used to make articles like seat cushions.

Regarding claim 5, modified BIGLIONE teaches the blowing agent-containing styrene polymer melt comprises between 2 to 10% by weight of one or more blowing agents selected from the group of aliphatic hydrocarbons [col.1: 26-28, col.4: 7-11].

Regarding claim 15, modified BIGLIONE teaches of expanded polystyrene particles produced by polymerizing styrene in aqueous suspension in the presence of blowing agents [ZIMMERMANN: col.2: 7-11]. It would have been obvious to one of ordinary skill in the art to determine and modify the amount of water in the polymer melt in order to the production of styrene granules with high expandability used to make articles like seat cushions.

Regarding claim 17, modified BIGLIONE teaches that cutting or granulation of polystyrene melt was performed in chamber 8 where water circulated at the pressure of 9 Bar (granulation of melt carried out directly behind the die plate under water at pressure in the range from 1 to 10 Bar) [Example I; col.5, lines 40-44].

Regarding claims 20-23, Modified BIGLIONE teaches spheroidal granules with a diameter of about 1.2 mm (claim 22) [col.5, lines 39-40] with a density of 18 g/l are produced (claim 23) [col.5, lines 57-59]. Additionally, it is submitted that by providing a process similar to the claimed process, the particles having the claimed features would have naturally resulted. Additionally, it would have been obvious to one of ordinary skill in the art to adjust and modify the quantity of styrene monomer used in the process as taught by modified BIGLIONE to ensure production of styrene granules comprising a quality of high expandability.

5. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over BIGLIONE et al. (US 4,606,873) in view of ZIMMERMANN et al. (US 5,112,875) and MACK et al. (Trends in Underwater Pelletizer Technology: Considering New Types of Polyolefin Resins) as applied to Claim 20 above, further in view of PLATZER (US 3,072,581). As to Claim 24, modified BIGLIONE does not expressly teach the pigment content. However, at least about 0.5 percent inorganic pigment is conventional for polystyrene foams. For example, see PLATZER, col. 1, lines 45-50. It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of PLATZER into the modified BIGLIONE process in order to provide a color to the material of BIGLIONE.

6. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over BIGLIONE et al. (US 4,606,873) in view of ZIMMERMANN et al. (US 5,112,875) and MACK et al. (Trends in Underwater Pelletizer Technology: Considering New Types of Polyolefin Resins) as applied to claim 1 above, and further in view of CARMODY et al. (US 3,673,126).

Modified BIGLIONE teaches of a process for production of expandable granules of thermoplastic polymers like polystyrene as referenced in claim 1.

Regarding claim 6, modified BIGLIONE et al. is silent to specifically teach the types of additives comprising plasticizers in proportions in the range from 0.05 to 10% by weight, based on styrene polymer as required.

CARMODY et al. teaches a process for production of expandable thermoplastic polymer compositions wherein a thermoplastic polymer, blowing agent and additive are used to make a melt [Abstract]. CARMODY specifies that additives comprise plasticizers employed in amounts of from 0.02 to 5 % by weight of the polymer [col.4, lines 13-20]. At the time of invention, it would have been obvious to one of ordinary skill in the art to use the teaching composition comprising of plasticizer additives as taught by CARMODY et al. the process as taught by modified BIGLIONE et al. in order to strongly bind, adhere and incorporate the blowing agent into the polymer melt by using plasticizers to ensure formation of styrene granules comprising a high expandability quality used to make articles like seat cushions.

7. Claims 10 -14 are rejected under 35 U.S.C. 103(a) as being unpatentable over BIGLIONE et al. (US 4,606,873) in view of ZIMMERMANN et al. (US 5,112,875) and MACK

et al. (Trends in Underwater Pelletizer Technology: Considering New Types of Polyolefin Resins) as applied to claim 1 above, and further in view of KNAUS et al. (US 5,605,937).

Modified BIGLIONE teaches of a process for production of expandable granules of thermoplastic polymers like polystyrene as referenced in claim 1.

Regarding claims 10 and 12, modified BIGLIONE is silent to teach that the die head or plate has holes having an L/D ratio of at least 2 (claim 10); and that the die plate has holes having a conical inlet with an inlet angle alpha of less than 180 degree (claim 12). Regarding claims 11, 13 and 14, modified BIGLIONE is silent to teach the diameter of the holes at the die entrance of the die plate is at least twice as great as the diameter at the die exit (claim 11); die plate has holes having a conical outlet with an outlet angle beta of less than 90 degree (claim 13); and that the die plate has holes having different exit diameters (claim 14).

KNAUS et al. teaches of a process for making moldable thermoplastic polymer foam beads comprising of a thermoplastic polymer, blowing agents and additives wherein the extruder comprises a die head 24 as shown in Figure 1 [Abstract]. As seen in Figure 1, the die head 24 wherein die entrance within die head 24 is greater than the die exit 30 (claim 11: the die entrance of the die plate is at least twice as great as the diameter at the die exit) [Figure 1]. In addition, in Figure 1, the length of the die zone within the die head 24 seems to be greater than the diameter (D) of the die exit 30 (claim 10). Figures 2 and 3 show die heads having conical outlet with an angle of less than 90 degree (claims 12 and 13). As seen in Figures 1-4, extrusion devices comprise die heads with different exit holes with different diameters (claim 14).

At the time of invention, it would have been obvious to one of ordinary skill in the art to use the teachings of the die head characteristics as disclosed by KNAUS in the process as taught

by BIGLIONE et al. in order to produce different marketable size and shape polystyrene granules from expandable styrene polymers with high degree of expandability due to the use of low level blowing or foaming agents used to make a wide range of articles useful in many applications.

8. Claims 16 and 20-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over BIGLIONE et al. (US 4,606,873) in view of SCHIPPERS (US 3,410,938) and MACK et al. (Trends in Underwater Pelletizer Technology: Considering New Types of Polyolefin Resins).

Regarding claim 16, BIGLIONE et al. teaches of a process for production of expandable granules of thermoplastic polymers like polystyrene, which have inherently been polymerized from monomers, wherein an expanding agent is incorporated with polystyrene polymer in a polymer melt which is extruded at 160 degree Celsius [Abstract; claim 1; claim 7; example 1: 33-35]. BIGLIONE additionally suggests that extrusion temperature is a result effective variable which must exceed the softening temperature [col. 3, lines 28-47]. BIGLIONE teaches that the die head comprises several holes having diameters that may be 0.7 mm [5:35-36] or vary between 0.5 and 4 mm [col.3, lines 55-56], and that the extrusion temperature depends on the sizes of the die-head holes [col. 3, lines 36-47]. The polymer melt extruded from the die head was granulated into granules having a diameter about 1.2 mm (and subsequently granulating the extrudate) [Example I, col.5, lines 36-40]. The values of die holes diameter and temperature at which process was carried as taught by BIGLIONE are inclusive of the ranges as required in claim 1.

BIGLIONE is silent step b) and that polymer melt was cooled to a temperature of 160-240 degree Celsius in step d).

However, degassing a polymer melt is conventional. For example, SCHIPPERS teaches a degassing chamber (4) for removal of gas from the molten polymer (3:44-53).

Additionally, MACK et al teach providing molten material at a temperature greater than 150 C (Fig. 4, left) and cooling the polymer melt to its desired extrusion temperature. It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the pelletizer of MACK et al. into the process of BIGLIONE et al. in view of BIGLIONE et al's suggestion to use an underwater pelletizer, and MACK et al's teaching of a pelletizer within the scope of those suggested by BIGLIONE et al. It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the degassing of SCHIPPER into the process of BIGLIONE et al. in order to carefully control the foaming of the resin and remove water vapor and oxygen from the polymer melt.

Regarding claims 20-23, Modified BIGLIONE teaches spheroidal granules with a diameter of about 1.2 mm (claim 22) [col.5, lines 39-40] with a density of 18 g/l are produced (claim 23) [col.5, lines 57-59]. Additionally, it is submitted that by providing a process similar to the claimed process, the particles having the claimed features would have naturally resulted. Additionally, it would have been obvious to one of ordinary skill in the art to adjust and modify the quantity of styrene monomer used in the process as taught by modified BIGLIONE to ensure production of styrene granules comprising a quality of high expandability.

9. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over in view of SCHIPPERS (US 3,410,938) and MACK et al. (Trends in Underwater Pelletizer Technology: Considering New Types of Polyolefin Resins) as applied to Claim 16 above, in view of PLATZER (US 3,072,581). As to Claim 24, modified BIGLIONE does not expressly teach the pigment content. However, at least about 0.5 percent inorganic pigment is conventional for polystyrene foams. For example, see PLATZER, col. 1, lines 45-50. It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of PLATZER into the modified BIGLIONE process in order to provide a color to the material of BIGLIONE.

Response to Arguments

10. Applicant's arguments filed 20 May 2009 have been fully considered but they are not persuasive. The arguments appear to be on the following grounds:

a) A person who contemplates the Zimmermann process together with Biglione appreciates that the Zimmermann process is within the realm of art addressed by Biglione. Biglione specifically states that the expandable granules are similar to the well known expandable beads obtained by suspension. One would have no apparent reason to employ the beads of Zimmermann in the process of Biglione since the Zimmermann beads already comprise an appropriate amount of blowing agent.

b) The Examiner commented on the foregoing argument, but Rogov (US 2008/0203597) demonstrates and confirms that processes such as those of Biglione require the use of

polystyrene with a molecular weight less than 200,000. This explanation corroborates that the Biglione process could be achieved with styrenes of all molecular weights.

c) Cuff describes pelletizing of polypropylene, but without blowing agent. A person readily distinguishes between a blowing agent-containing polymer melt and the blowing agent-free melt. Biglione mentions the problematic of undesirable premature expansion. One would not reasonably be motivated to further increase the risk of undesirable premature expansion by heating the die plate to an even higher temperature. Cuff and Guill may support that heating a die plate is conventional in the art of pelletizing blowing agent-free thermoplastic material, there is no teaching that this could be employed successfully in extrusion of a blowing agent-containing polymer melt.

d) A person in the art could not reasonably expect measures known to be suitable in the extrusion of blowing agent-free thermoplastic materials to be equally applicable to materials which contain blowing agents since the melt viscosity of the resin becomes significantly lower in the presence of a blowing agent. Those in the art were aware that the use of a heated die plate used with a blowing agent-containing polystyrene would cause foaming and inadequate cooling. In view of the risks of premature expansion, a person would have been discouraged from heating the die plate.

1. These arguments are not persuasive for the following reasons:

a,b) The Examiner has carefully considered these arguments and provides additional evidence believed to support the position set forth previously. While Rogov appears to suggest that a multitude of prior art references generally use lower molecular weights, the Examiner instead

points to the attached article by Bremner. Bremner discloses correspondence between melt flow index values and weight average molecular weights for various commercial thermoplastics, including in particular, polystyrene. For example, Biglione discloses at col. 5, lines 27-29 a melt index of 10. Bremner suggests that polystyrene of a similar melt flow index (which requires interpolating between MFI values of 4.6 to 11.9 between samples 1 and 2, respectively) actually has a weight average molecular weight (M_w) of around 280,000, within the claimed range. Thus, it is not believed to be the case that Biglione is suggesting a different molecular weight than the claimed range or the molecular weight disclosed by Zimmermann. To the contrary, the melt index disclosed by Biglione appears to be suggesting values within the scope of molecular weights taught by Zimmermann.

Applicants appear to recognize that the Examiner's position is not that it would be obvious to place the pellets of Zimmermann into the Biglione process, but instead that one practicing the Biglione process would have found it obvious to select polystyrene molecular weights having desirable foaming capabilities. In other words, the polystyrene molecular weight should not interfere with or detract from the foaming capability of the pellets. The Examiner remains of the view that one practicing Biglione would have obviously selected the same molecular weight as that disclosed by Zimmermann in view of its recognized capability to be used in expandable polystyrene particles, especially when the Bremner reference is applied for evidence showing a correspondence between melt index and molecular weight.

c,d) The new reference to Mack (supplied in the 20 May 2009 IDS) is cited, in part, as a rebuttal to these arguments. Even if one were motivated to avoid premature expansion of the pellets produced by the Biglione process, the Mack reference demonstrates that it is conventional to heat

the die plate while simultaneously providing a wall temperature which is either maintained constant (Fig. 4, right) or decreases (Fig. 4, left). In other words, Mack teaches or suggests that a die plate can be heated to a temperature above that of the melt without increasing the temperature of the melt. Thus, even if one would have been motivated to avoid increasing the temperature of the melt to avoid premature expansion, the Mack reference demonstrates that the die plate can be heated to a temperature above the temperature of the melt (See 280 C in Fig. 4 of Mack), without necessarily increasing the temperature of the polymer melt. Mack appears to suggest that this higher die plate temperature is merely used to counteract the water applied to the die plate, and leads to a progressive decrease in polymer temperature. See "wall temperature" in Fig. 4.

The Examiner submits that the motivation for heating the die plate of Biglione (to avoid solidification of the resin in the extrusion die) is valid and does not require any increase in the polymer temperature which would lead to premature expansion.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MATTHEW J. DANIELS whose telephone number is (571)272-2450. The examiner can normally be reached on Monday - Friday, 8:00 am - 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christina Johnson can be reached on (571) 272-1176. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Matthew J. Daniels/
Primary Examiner, Art Unit 1791
7/31/09